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I have also formed a table for $\mu = 1{\cdot}513$, of which the results are given; and from these we can derive close approximate values for the proportions of polarized light for values of μ not differing much from these values.

The probable values for $\mu = 1{\cdot}54$ are given in the table.

If we employ the four plates as a depolarizer to determine the proportion of polarized light in the incident beam by reducing the light to its ordinary unpolarized state, then the proportion of polarized light in the incident beam will be given, for any angle of complete depolarization, by the value of $\frac{p}{n+p}$ for that angle.

Extract from a Report of the Eclipse Expedition of 1870, *at Augusta, Sicily.* By John Brett, Esq.

During the violent squalls of the night of the 21st, some heavy rain fell, and the morning of the Eclipse dawned badly. A sketch was made of the sunrise, which was red and threatening; but after daylight the sky partially cleared, and all the morning we remained in suspense, hoping perhaps, but dreading certainly.

Two members of our party were now detailed to Villa'smunda, and a Sapper, named Buchanan, was taught by Professor W. G. Adams to call the time in the observatory.

As the day advanced the sky rather improved, and the Sun's limb was fairly steady. The apparatus in my compartment of the observatory consisted chiefly of a reflecting telescope of silvered glass, 8½ inches aperture and 7 feet focus, made by Mr. Browning, with an altitude and azimuth mounting of extraordinary steadiness. The defining power of this instrument is of first-rate excellence; and one side of the tube being entirely removed, no air-currents are generated in it by the Sun's heat, nor are any musical vibrations set up by the wind. Affixed close to the eye-tube was a card with a black disk on it for the purposes of drawing, and another for writing notes. The observations were commenced with a solar eye-piece, consisting of a first reflection prism, to which were applied alternately a Kellner with a field of 45′, power 75; a Kellner with field of 35′, power 100; and one of Mr. Browning's exquisite achromatic doublets, power 200; the two former supplied with dark glass, the latter with a sliding wedge. The first contact was beautifully seen and the exact time noted, the limb being fairly steady and the instrument perfectly so. Ten minutes later I suspected traces of a weak halo round the Sun, and at twenty minutes after first contact this had become more pronounced, presenting a tolerably well-defined boundary at a distance of about 2′ from the limb. I begged Mr. Burton, my next neighbour in the observatory, to bring his experienced eye to bear upon it, which he did. At the same time he called my attention to a tinge of redness towards the Sun's limb (on the disk), of the

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colour of iron rust, which remained permanent. The halo was of a pallid grey colour. It was equally distinct under either of the eye-pieces mentioned above, and at a later stage of the eclipse the Moon's disk was decidedly visible beyond that of the Sun for about 2′ projected with a clear edge upon the halo. I could come to no other conclusion than that this was really the corona; yet it seemed to me a suspicious circumstance that it did not grow much more vivid as the eclipse approached totality. The Moon's limb was beautifully defined on the Sun's disk, and *considerably sharper* than the limb of the Sun. The contrast of the two limbs in this respect was very remarkable. There was, however, a weak illumination encroaching upon the Moon, of a greyish tint, but it faded away from the limb inwards imperceptibly, and was nowhere nearly so intense as the halo or corona of the Sun. Occasionally some clouds passed over, but nothing in any degree disturbed or interfered with the halo.

At Mr. Burton's suggestion I very carefully observed the eclipse of two large spots with power 200 for distortion, but found no trace of any, definition being then good. After this period I directed my attention chiefly to the cusps; but, although they were blunted more or less, nothing remarkable occurred until five or six minutes before the total phase, except that I satisfied myself that the Moon's disk was only visible off that of the Sun, as far as the halo or corona extended. The wind which had been strong all day now increased considerably; some of the more violent gusts being very inconvenient in the observatory; and for instruments not very steadily mounted would have been a serious hindrance. There were plenty of clouds about, but not threatening total obscuration, and hopes of a good observation were entertained freely. The silence within the observatory was contrasted in a singular manner by the increasing roar and howling of the populace without, who seemed to have assembled in a dense multitude about the further borders of the glacis in a state of great excitement. The time seemed immensely long. I was keeping my attention on the cusps, and had already seen one or two beads nipped off by the Moon's mountains, and the time had come to prepare for the total phase. About five minutes before that period I went to the side of the observatory and looked over at the landscape for a few seconds, but beyond a general gloom over all, of a leaden lurid hue such as I expected, I saw nothing particularly remarkable.* The clouds were getting worse, and the approaching shadow was not visible on the hills.

I returned to the telescope without delay, removed the solar eye-piece and introduced the Kellner, power 100, with dark glass,

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* I believe that the wonderful character of the terrestrial appearances recorded during eclipses is to a great extent the measure of the observer's ignorance of ordinary cloud phenomena. Such appearances (to judge from my own experience) would hardly strike a landscape-painter as very abnormal; but the truth is, that very few persons besides artists have ever paid enough attention to clouds and their effects upon landscape scenery to enable them to answer the most elementary questions respecting them.

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to take a last look at the cusps before introducing the large field eye-piece with which I proposed to examine the corona. I now beheld a beautiful sight: a delicate and exquisitely defined little ray or cone of light emanating from the south cusp in a direction tangential to the Moon's limb.

Its length was not more than 3′; possibly something less. Its light was less intense than that of the cusp, but as beautifully defined as anything I ever saw in my life. Its termination at the weak end or base of the cone was clearly visible and not diffused indefinitely, and the angle at the apex was small, not more than 5°.

In my drawing of this phenomenon I have rather exaggerated the angle and also the diffuseness of the base, in order to show its character, for the refinement of drawing necessary to represent accurately so delicate an image is forbidden by the coarseness of the materials employed. Having examined this for a few seconds, I brought the north cusp into the field and found a similar ray there, but somewhat smaller. The cloud over the Sun now became so dense as to impede vision seriously, and cause the most profound anxiety. The beads were being nipped off the cusp in rapid succession, and presently the whole rim broke up instantly into fragments of various lengths, and disappeared, and left utter darkness. The dark glass (which I held in my hand) was discarded, but not a trace of anything was visible. I quickly pulled out the eye-piece and replaced it with the lowest power, for the agonising thought occurred to me that the object would presently be out of the field and lost beyond hope; for my finders could do nothing towards penetrating the cloud. I quickly slid in the large field eye-tube but still saw nothing. It might now, I thought, have passed even out of this field, but I dared not move the instrument. The counting of seconds by the Sapper had already advanced to a frightful number, and these were periods of misery never to be forgotten.

Near at hand I had set up a small but beautiful achromatic telescope to supplement my large instrument, fitted with a terrestrial eye-piece that gave a field of a degree and a half and power of 20, hoping by it to be able to take in the streamers (if there were any) at one view. I now turned to that; when presently the prominences burst all at once into view; and I immediately went back to the reflector and happily got a magnificent sight of them; but I was astonished and disappointed at not finding any distinct boundary to the corona, nor any hint whatever of streamers. The whole limb was literally crowded with prominences, varying in colour from white and yellow to pink and nearly crimson. One crooked flame-coloured one was particularly conspicuous.

The appearance on the whole was far more like terrestrial conflagration than I expected.* One respect in which this

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* Especially the combustion of wood in a baker's oven when nearly exhausted.

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resemblance seemed to me obvious was the proportion both in quantity and luminousness which the flames bore to the haze of shapeless vapour in which they were mixed up. This haze was so like what one sees in a terrestrial conflagration that the idea never would have occurred to me that it was self-luminous. The light that showed no defined form was not a clear flat halo, but suggested the uncertain turmoil of the results of combustion in a furnace.

Some of the tongues or prominences were extremely vivid, but others were much mixed up with the general light surrounding the limb. There were no spaces where you could say this is mere corona, for at a greater distance than the apex of the highest flame I can hardly say there was any decided light. I don't think there was anything visible beyond 5′ of the limb, and the highest flame might have been probably 4′. I must confess I was extremely vexed not to see anything like the corona I expected; I should never have called this a corona at all. The basis of it was a seething mass of flames of a languid character; some of them so languid as to lose the spiral shape of flame and lie in heaps, and the intervals between them were apparently filled with gaseous material which might be illuminated by them. I do not think the disk was ever entirely free from cloud during totality. There were certainly no streamers, so I conclude they must have been intercepted by the cloud. I do not mean merely that their light was, but their cause also; for I assume that the shadow of the Moon must inevitably chill and condense much floating moisture in our own air, and send it down as dew. And these falling particles would reflect the light emitted by the prominences, and the effect of perspective would give them an appearance of radiating beams from the Moon's limb, or rather from that neighbourhood, although the regularity of radiation might be interfered with by various terrestrial causes. I conclude that the dew which would have formed streamers was, at Augusta, intercepted or prevented by the cloud; although the latter was not dense enough to conceal much. I have often seen *Jupiter's* belts beautifully through a denser cloud certainly. I did not see *Saturn* on this occasion, it is true. I must confess, however, that I entirely forgot to look for him, my attention being too intently fixed on the subject of the corona.

The view, on the whole, I suppose lasted about ten seconds, but my drawing,* though necessarily done afterwards, gives a very fair general representation of what I saw. I marked down the positions of three chief prominences, and went again to the small telescope to seek for streamers, but found none, and the Sun almost immediately burst forth, compelling me to quit the instrument.

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* The drawings referred to in this paper will be published by the Organising Committee with the rest of the Report.